

## REFERENCES

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## Reply

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We are indebted to Dr. O'Brien [1] for calling the work of Carré [2] to the attention of us and perhaps of other investigators. Our interest in the omega equation stems from a desire to use this equation to obtain diagnostic vertical motions for careful analysis of the three-dimensional structure of atmospheric systems. Having started such studies late in 1960 prior to the work of Carré and prior to knowledge of Miyakoda's [3] work, I was forced into the more empirical approach for finding the optimum over-relaxation factor,  $\alpha_{opt}$ , as mentioned in our paper (Stuart and O'Neill [4]). Since some knowledge of the over-relaxation factor was needed for our work, we decided to search a bit for  $\alpha_{opt}$ . We tested the 1-D and 2-D cases more for completeness and to show that our relaxation technique fitted the known theoretical results. Suffice it to say that our paper reports on the results of an  $\alpha_{opt}$  study for a particular grid and stability profile and we hope other investigators will benefit by Carré's paper and our results. Indeed we have followed the approach suggested by O'Brien at the end of his section 4, but without the aid of Carré's work.

Recently I have extended the model to yield omega at nine interior levels for the  $2^\circ$  grid (i.e.,  $N_x=N_y=18$ ,  $N_p=11$ ,  $\Delta p=10$  cb., and  $\sigma$  for the standard atmosphere).  $\alpha_{opt}=0.15$  was found with the sharp cutoff near 0.20. Again  $\alpha_{opt}$  was found at a much lower value than the 0.33 given by Miyakoda's [3]. It is hoped that the results for  $\alpha_{opt}$  obtained for our grid model will be of aid to others using very similar models for obtaining omega.

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